

REMARKS

The present invention is a device for coupling ultrasonic waves into a solid body 8 to be ultrasonically probed by a boundary surface located outside a closed volume. The device described with reference to an embodiment of the invention includes at least one ultrasonic-wave transducer unit 6, which couples ultrasonic waves into the solid body via a gaseous coupling medium provided between the at least one ultrasonic-wave transducer unit and the boundary surface. The ultrasonic waves generated by the at least one ultrasonic-wave transducer unit are directed into the closed volume, which is provided with at least a first opening 3 and a second opening 4. The closed volume is bordered by a housing 2, in which the at least one ultrasonic-wave transducer unit is contained. The housing has a surface 7 spaced from the boundary surface which defines and extends outward from the second opening 4 to define a channel between the housing surface and the boundary surface as illustrated in Figs. 1 and 2. Pressurized gas flows from the interior of the closed volume out the second opening 4 through the channel as indicated by arrow 9 while contacting the housing and boundary surfaces as illustrated in Figs. 1 and 2. The present invention utilizes the hydrodynamic paradox as discussed in paragraph [0008] of the Substitute Specification.

Claims 14-17, 20, 29, 31-33, 35-41 and 43-48 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner has correctly questioned the antecedent "the opening" in claims 14 and 15 which have been amended to refer to "the second opening" and in claim 48, the antecedent for the

"surfaces" which has been amended to refer to "the housing and boundary surfaces".

Claims 14-17, 20, 29, 31-33, 37-41, 43-46 and 48 stand rejected under 35 U.S.C. §102 as being anticipated by United States Patent 4,944,186 (Dorr). The Examiner reasons as follows:

With regards to claims 14-17, 20 and 41, Dorr discloses an ultrasonic measuring system comprising, as illustrated in Figures 1-6, at least one ultrasonic-wave transducer unit UT (a transducer that includes a transmitter and a receiver) which couples ultrasonic waves into a solid body HI via a coupling medium (i.e. pressurized air stream AS, as observed in Figure 1C) provided between the transducer unit and a boundary surface (i.e. the surface TA of the solid body HI is considered the boundary surface) wherein the ultrasonic waves generated by the transducer unit UT are being directed into a closed volume (i.e. the enclosed space located in housing 24) provided with a first opening (i.e. the opening where a compressed air line supplies a source of air 20 thru is considered the first opening) and a second opening (i.e. the opening where air and the ultrasonic waves passes through cowling 25 by jet nozzle 22, note Figure 3); the closed volume is bordered by the housing 24 in which the transducer unit is contained (note Figure 5) includes a housing surface (i.e. an exterior surface 24S of the housing) that is spaced from the boundary surface which defines and extends outward from the second opening to define a channel (i.e. the path MP where the ultrasonic waves and air travel and are being measured, note Figure 2A) between the housing surface and the boundary surface; a flow of gas 20 (i.e. compressed air) is directed into an interior of the closed volume through the first opening and exits through the second opening which is directly facing the boundary surface and flows through the channel outward from the opening. (See, column 2, line 65 to column 5, line 17).

This ground of rejection is traversed for the following reasons:

Claim 14 recites a device for coupling ultrasonic waves into a solid body to be ultrasonically probed via a boundary surface located outside a closed volume comprising at least one ultrasonic-wave transducer unit...; the closed volume being bordered by a housing..." and "a source of gas providing a flow of gas producing an overpressure inside the closed volume which is

directed into an interior of the closed volume through the first opening, and which exits the closed volume through the second opening which directly faces the boundary surface and flows through the channel outward from the opening while contacting the housing and boundary surfaces." This subject matter is not anticipated by Dorr.

The Examiner's construction of Dorr as set forth above interprets the boundary surface to be the surface TA, as illustrated in Fig. 1D, and exterior surface 24S, as illustrated in Fig. 2A, as being the housing surface. This subject matter does not meet the claimed source of gas providing a flow of gas producing an overpressure inside the closed volume which is directed into an interior of the closed volume through the first opening, and which exits the closed volume through the second opening which directly faces the boundary surface and flows through the surface outward from the second opening while contacting the housing and boundary surfaces. While the Examiner refers to surface 24S as being the housing surface, it is quite clear that the orthogonal orientation of the four jets 22-1, 22-2, 22-3 and 22-N as illustrated in Fig. 4, produces an air flow which does not flow through a channel between the surface TA and the surface 24S outward from the second opening while contacting the housing and boundary surfaces. Clearly, the airflow direction AS in Fig. 1C cannot be read to meet the aforementioned limitation.

Moreover, there is no basis why a person of ordinary skill in the art would be led to modify the teachings of Dorr et al to create the claimed flow of

gas in the channel outward from the second opening while contacting the housing and boundary surfaces without resorting to impermissible hindsight.

A person of ordinary skill in the art understands Dorr to teach that the air jets are for the purpose of creating a substantially uniform temperature gradient which is free of turbulent airflow which is achieved "by blowing high pressure air in a direction from the transducer towards the target" as set forth in column 4, lines 19-47. Therefore, there is no reason why a person of ordinary skill in the art would be motivated or even consider the utility of having the flow of gas produced by the jets 22-1, 22-2, 22-3 and 22-N to flow in contact with the housing surface 24S since such flow would be directly opposite to directing the jets to discharge pressurized air orthogonal to the surface 24S to produce a substantially uniform temperature gradient which is free of turbulent flow of air. Accordingly, it is submitted that claims 14-17, 20, 29 and 31-33 are patentable for the reasons set forth above.

Claims 37-41 and 43-46 respectfully limit claims 14, 16, 17 and 20 and claims 29, 31, 32 and 33 in reciting that the flow of gas passes through the second opening facing the boundary surface and flows between an upper side of the housing and the boundary surface and the boundary surface and the upper surface extends radially relative to the second opening to define the channel, and a vacuum draws the housing toward the second boundary surface to create a gas cushion in the channel of the thickness at which a force of attraction is created by the vacuum and a force of repulsion present due to a mass impulse of the flow of gas between the housing and the boundary surface are in equilibrium. This subject matter has no counterpart

in Dorr. It is noted that the Examiner cites column 4, lines 19-47, for this subject matter. However, there is no description therein of the claimed vacuum interacting with the housing to draw the housing toward the boundary surface to create a gas cushion in the channel of the thickness at which a force of attraction is created by the vacuum and a force of repulsion present due to a mass impulse of the flow of gas between the housing and the boundary surface are in equilibrium. If the Examiner persists in the stated grounds of rejection, it is requested that he specifically point out how he has interpreting column 4, lines 19-47, to meet the subject matter of claims 37-40 and 43-46.

Claims 35-36 and 47 stand rejected under 35 U.S.C. §103 as being unpatentable over Dorr in view of United States Patent 4,787,407 (Vogel). This ground of rejection is traversed for the following reasons.

Claim 35 further limits claim 29 in reciting that the sound conducting means separates a first spatial zone inside the closed volume, in which ultrasonic waves propagate without interference from the flow of gas and a second spatial zone in which the gas flow is directed. The Examiner's reliance upon Vogel is misplaced. The Examiner cites Vogel as disclosing an apparatus comprising a sound conducting means to couple the ultrasonic waves in the flow within a cylinder circulator 5 to guide the coupling medium past the transducer unit 1 and further, the Examiner concludes that it is well-known in the art to include some type of sound conducting means to prevent the ultrasonic waves from interferences so that better ultrasonic waves are obtained for measurements. In the first place, the Examiner's contention

regarding what is well-known in the art is challenged since the Examiner has not demonstrated in what sense the use of sound conducting means to prevent the ultrasonic waves is in fact known anywhere let alone in any particular application, such as, in accordance with the present invention. Moreover, Vogel's teachings are with regard to sound transmission within a fuel delivery pump to detect the fuel level in the tank being filled by detecting reflections from the fluid level in the tank. It is submitted that Vogel's application is sufficiently diverse from that of the present invention that a person of ordinary skill in the art would not be led to combine the teachings of Dorr and Vogel for any reason without the exercise of impermissible hindsight. If such a combination were made, the claimed invention would not be achieved. The cylindrical circulator 5 is for the purpose of permitting fuel and sound to pass into the tank whose fuel level is being measured which is submitted to be a teaching which is not analogous to the sound conducting means of the present invention which would not lead a person of ordinary skill in the art to consider combining Vogel with Dorr for any reason, let alone to arrive at the subject matter of claim 35.

Claim 36 defines the sound conducting means as comprising a funnel which guides the ultrasonic waves from the at least one ultrasonic-wave transducer unit to the second opening without being repeated by the flow of gas. Claim 36 is patentable for the same reasons set forth above with respect to claim 35.

Claim 47 further limits claim 35 in the same manner as claims 37-40 and 43-46 respectively limit claims 14, 16, 17, 20, 29, 31, 32 and 33.

Claim 47 is patentable for the same reasons as set forth above with respect to those claims.

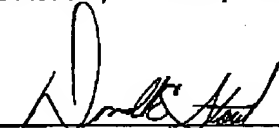
Claim 48 further limits claim 14 in reciting the channel is of substantially uniform spacing measuring between the housing and boundary surfaces. Claim 48 is patentable for the same reasons set forth above with respect to claim 14 in that Dorr does not disclose the flow of gas outward from the second opening while contacting the housing and boundary surfaces with a channel having substantially uniform spacing.

In view of the foregoing amendments and remarks, it is submitted that each of the claims in the application is in condition for allowance. Accordingly, early allowance thereof is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (785.39987X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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Attachments

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